
Chapter 13

Covert Positive Reinforcement Studies: Review, Critique, and Guidelines*†

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Summary — The paper critically examines the experimental literature on covert positive reinforcement, including analogue tasks, attitude analogues, and clinical analogues. Methodological deficiencies across studies (e.g., variability in subjects' motivation and in experimenters' expertise, non-standardized outcome measures) are discussed, and suggestions for more systematized future research are presented.

Imagery has been employed in the clinical setting and the laboratory for a number of years. Wolpe's systematic desensitization (1958) was the first major technique systematically employing imagery in behavior modification. This technique has been extensively used to modify maladaptive avoidance behavior. Critical reviews of the literature on desensitization are published elsewhere (Bernstein & Paul, 1971; Paul, 1969a; 1969b).

Recently Cautela (1973) has developed a number of techniques which he calls covert conditioning. These techniques have been clinically employed to modify both maladaptive approach and maladaptive avoidance behavior. They

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have been successfully used in treating a number of seemingly intractable cases, such as heroin addiction (Steinfeld, Rautio, Egan & Rice, 1972; Wisocki, 1973b), intravenous amphetamine addiction (Gotestam & Melin, 1974), severe self-injurious behavior (Cautela & Baron, 1973), transsexualism (Barlow et al., 1973), obsessive-compulsive behavior (Wisocki, 1970, agoraphobic behavior (Flannery, 1972b), and suicidal attempts (Jurgela, in press).

These techniques are labeled covert because both the response to be manipulated and the stimulus are presented to imagination (Cautela, 1973). There are five techniques which are analogous to the operant techniques developed in the laboratory. They are: covert positive reinforcement (Cautela, 1970a), covert negative reinforcement (Cautela, 1970b), covert sensitization (punishment) (Cautela, 1966; 1967), covert extinction (Cautela, 1971a) and covert modeling (Cautela, 1971b).

Cautela has based the covert conditioning techniques on two assumptions. First, covert events (thoughts, feelings and images) obey the same laws as overt events. Secondly, covert events, if applied systematically via instructions, can effectively control other covert and overt behavior in the same way as externally applied stimuli (Cautela, 1970c; 1973).

There have been a number of experimental studies on the covert conditioning techniques (Cautela, 1973). The purpose of this paper is to critically examine the experimental literature on one of these techniques, covert positive reinforcement (COR) and to make suggestions for more improved and systematized research. A discussion of the COR procedure will provide the background for a discussion of the literature.

THE COVERT REINFORCEMENT PROCEDURE

The purpose of covert reinforcement is to increase a response frequency by following it with a reinforcer. Both the response and the reinforcer are presented in imagination.

There are three steps involved in the application of COR (Cautela, 1970c). The first step involves the determination and selection of the response to be increased. Secondly, reinforcers must be selected and determined for use. The Reinforcement Survey Schedule (RSS) (Cautela & Kastenbaum, 1967) may be used for this purpose. A number of studies have shown that the RSS is both reliable (Keehn, Bloomfield & Hug, 1970; Kleinknecht, McCormick & Thorndike, 1971; 1973) and valid (Mermis, 1971). Reinforcers may also be determined from interviews with the subject and/or significant others, such as family and staff. Finally, the subject is asked "to imagine" the response to be increased followed by the previously determined reinforcer. Cautela (1973) describes "to imagine" as follows:

I am going to have you imagine certain scenes, and ask you to imagine you are really there. Try not to imagine that you are simply seeing what I describe; try to use your other senses as well. If in the scene you are sitting in a chair, try to imagine you can feel the chair against your body. If, for example, the scene involves being at a party, try to imagine you can hear people's voices, hear glasses tinkling, and even smell the liquor and food. Now remember, the main point is that you are actually there experiencing everything. You don't see yourself there, but are actually there.

COVERT REINFORCEMENT STUDIES

The focus of this paper is on the analysis of research design. There are 13 studies which have been divided into three general types of research: analogue tasks, attitude analogues, and clinical analogue studies.

Analogue Tasks

The target behaviors in these studies are less complex than those used in clinical studies. They are relatively simple and less generalizable to real life settings.

Cautela, Steffen & Wish (in press) showed subjects slides of circles and asked them to estimate the diameters. The mean estimation served as the baseline. There were five groups: (1) The COR group. Subjects imagined reinforcing scenes either after an under estimation of circle size as compared to their baseline or an over estimation. No subject was instructed to use COR for both an over and under estimation. (2) No scenes. (3) Non-contingent reinforcing scenes. (4) The experimenter said the word "reinforcement" after an over or under estimation of circle size. (5) "Neutral" contingent scene. "Neutral" was not defined. These last three groups controlled for the alternative hypothesis that something in the procedure itself, rather than the contingent reinforcing scene, produced a change in behavior. The COR group had a predicted change in circle size perception as compared to all groups except the word "reinforcement" alone group. This last group was significantly different from the no-scene group. The circle size task has also been employed in a study by Tondo & Cautela (1974) examining some of the important variables in the COR procedure. This study is more appropriately discussed in the section on process studies below.

Steffen (1971) used contingent COR to study the Greenspoon effect. The subjects were hospitalized patients with a diagnosis of "schizophrenia, chronic undifferentiated type." Subjects said 200 words, one at a time. Results were analyzed in blocks of 50 words each. Experimental manipulation occurred only during blocks two and three. The experimental group imagined a scene contingent upon a plural noun. The four control groups were similar to Cautela, Steffen & Wish (in press) except that the word "scene" was substituted for the word "reinforcement" in group four.

Compared to block one, only the COR group emitted a significant greater number of plural nouns in block four. It is interesting to note that while simple "attention" um hum, etc. changed the frequency of the emission of certain word classes (Greenspoon, 1951), in this experiment attention, i.e., the word "scene" by itself did not significantly change the number of plural nouns emitted.

Krop, Messinger, & Reiner (in press) reinforced eye-contact on an anxiety arousing self disclosure questionnaire. During baseline, an interviewer asked the subject questions while he looked the subject in the eye. A hidden observer recorded the length of the subject's eye-contact. During the experimental session the COR group was instructed to imagine a "pleasant" scene following five or more seconds of eye-contact. The control groups were a contact control group and a non-contingent control group. The COR group was significantly different from both groups on a post treatment interview administered immediately after treatment, but not on a follow-up of one week.

Ascher (1973) tested three hypothesis: (1) An imagined reinforcer following an image of a pronoun would increase the probability that the subject would use that pronoun in a simple oral sentence, (2) the increase in pronoun selection would vary directly with the number of reinforcers, and (3) COR would extinguish in a manner similar to overt extinction.

Subjects were supplied an infinitive verb and were asked to construct a simple sentence. The dependent measure was the pronoun choice. The experiment consisted of a baseline for all groups, COR for two groups, and extinction for one of the COR groups.

The COR subjects were asked to imagine a pronoun and then a reinforcing scene. There were 50 pairings: 30 of one pronoun and 10 each of two other pronouns. To control for satiation subjects were instructed to use three reinforcing scenes. A control group imagined 50 reinforcing scenes. A control group imagined 50 reinforcing scenes and then 50 pronouns of 30, 10, and 10. A baseline only was taken on a fourth group. During extinction one COR group imagined the same three pronouns once without the reinforcing scenes.

The first two hypothesis were confirmed. The third was not. Although subjects used fewer tested pronouns, the baseline rate was not reinstated.

This is the only analogue task procedure which employed Cautela's definition of COR, i.e., a covert behavior followed by a covert reinforcer. In all other studies the response to be increased was overt.

Attitude Analogues

The dependent variables in these studies were self-reported attitudes toward others and one's self. One methodological problem common to these studies concerns whether the measured change occurs in the self-report, in the actual attitude, or in both. Can we say that reinforcing a response on a questionnaire

results in an actual change or does it result in a change in the probability of a response unrelated to the attitude?

Cautela, Walsh, & Wish (1971) used COR to increase positive attitudes toward the "mentally retarded." Attitudes were measured by a questionnaire developed by the authors. The COR group subjects imagined a "mentally retarded" person, and then a "pleasant" scene. The control group subjects imagined a "mentally retarded" person only. Each group had one session to learn the scenes. They were then asked to practice the scenes at home. Subjects in both groups practiced an average of four times.

Three weeks later the questionnaire was readministered. Only the COR group had a significant increase in positive attitudes toward the "mentally retarded," as measured by the questionnaire.

Since the subjects were asked to imagine a "mentally retarded" person, one would hypothesize that there would only be an increase in the frequency of thinking about a "mentally retarded" person. The authors implied assumption was that the thinking frequency was somehow positively correlated with an attitude.

Two similar studies used COR to increase subjects' positive "self-concepts." The subjects were read statements from the Tennessee Department of Mental Health Self-Concept Scale (TDMH). The dependent measure was the subjects' response to the statements indicating a positive "self-concept." The first and third administration constituted the pre-post measures. The second administration was used in the experimental session.

In Krop, Calhoun, & Verrier (1971), the COR group imagined a reinforcing scene following an appropriate response. An overt reinforcement group received a token (subjects were already on a token system) and a gum drop. It is unclear why this group received two reinforcers and the COR group received only one. Nothing followed the responses of a control group. A noncontingent covert reinforcement group replaced the overt reinforcement group in Krop, Perez, & Beaudoin (1973).

In both studies only the COR group changed significantly from the first to the third administration of the TDMH. Change in the overt group in the first study did not reach significance. It seems that COR was more powerful than overt reinforcement. The two groups, however, received different reinforcers.

The authors state that both studies result in increased positive "self-concepts." Although the experiments were successful, the results may actually be an increase in certain responses to certain statements. Reinforcement may have simply strengthened a "yes" or "no" response, or just an agreement with the statement and not to a generalized "self-concept."

It is important to note, however, that both studies used institutionalized patients. Subjects in the first study were children with a mean age of 10.5 years and diagnosed as having certain behavior disorders. Male psychiatric patients were subjects in the second experiment. These populations were chosen because they were seen as deficient in positive "self-concepts."

Clinical Analogues

Three clinical analogue studies and one clinical case manipulated anxiety related avoidance behavior. A fourth clinical analogue study manipulated the maladaptive approach behavior of overeating.

Flannery (1972a) used rat phobic subjects. An *in vivo* treatment group started 10 feet from the rat. They covertly reinforced themselves, and then were given the choice of proceeding to the next step on a 13 step hierarchy or remaining at the same step. A second experimental group went through the same procedures except that the approach behavior was also in imagination. Subjects in both groups were instructed to cease imagining 30 seconds after the experimenter said the word "reinforcement." A third group served as an attention control.

A Behavioral Avoidance Test (BAT) and two subjective scales were used. According to Bernstein & Paul's (1971) criteria, a good BAT must include (1) instructions on how to handle the phobic stimulus, and (2) firm instructions to approach it. Although exact instructions were not included, subjects appear to have been firmly instructed to approach the phobic stimulus. Therefore, this BAT measurement appears to have met the second criterion, and the use of heavy duty gloves may have eliminated subjects unfamiliar with how to handle the rat. Only the two treatment groups changed significantly from pre-post measures. The *in vivo* approach group had a greater reduction in fear on one subjective scale.

Marshall, Boutlier, & Minnes (1974) compared COR, systematic desensitization (labelled experimental desensitization), and covert negative reinforcement (CNR), to three control groups.

Volunteer subjects with a fear of snakes were used as subjects. A 15 point BAT measure similar to Flannery's, and one subjective scale were used as measures. Subjects were given gloves and instructed to approach the snake until they felt uncomfortable, but not to force themselves to go further. This does not meet Bernstein & Paul's criteria for firm instructions.

All subjects in each group, except the no contact control, were administered treatment in groups of four. There were six groups: (1) Systematic desensitization, using scenes from the BAT. (2) COR. The scenes were presented in a randomized rather than hierarchical order. The COR procedure was altered, however, since subjects were also instructed to relax after imagining the approach behavior, but before imagining the reinforcer. To avoid satiation, subjects were instructed to alternate among four reinforcing scenes. (3) CNR as described by Cautela (1970). (4) Non-contingent COR. (5) Placebo control which consisted of a discussion of "strategies for coping with fears." (6) No contact control.

Results indicated that all three experimental groups showed greater improvement than control groups five and six. The desensitization and COR groups were equally effective, and when their results were combined and

compared to the CNR group, the combined groups were more effective than the CNR on the BAT measure.

Wisocki (1973a) used COR to treat anxiety in a group setting. The experimental group listened to taped scenes of feeling calm and relaxed while in exam situations and doing well on the exam. A no contact group served as the control. The COR group only had a significant decrease in test anxiety.

All three of the experiments discussed above attempted to reduce anxiety. Ullmann & Krasner (1969) and Lang (1969) however, believe anxiety includes three general measurement methods: (1) physiological, (2) subjective, and (3) overt behavior. These three measures do not always correlate. Flannery and Marshall et al. used two methods. Wisocki, however, used only one: two anxiety scales. Bernstein & Paul's (1971) discussion of systematic desensitization analogue studies also seems applicable to the COR studies. They state:

A minimum requirement for any study in this area should be a demonstrable significant increase in anxiety, shown through direct multiple measurement of cognitive, physiological, and observable motoric behavior, as a result of the presence of the eliciting stimulus.

All three general methods of measurement were used for a single case design rat phobia (Blanchard & Draper, 1973). The client was a 20-year-old female college student with a "clinically disabling" phobia.

The experiment consisted of six phases: (1) "Psychotherapy" consisting of supportive and insightful history taking. (2) COR. The subject imagined a graduated series of approach behavior to the phobic stimulus followed by an imagined reinforcer. (3) Imagined approach behavior without the imagined reinforcer. (4) COR was reinstated. (5) No treatment for one week. (6) Participant modeling. During this phase, the experimenter modeled the approach behavior and encouraged the subject to do the same.

A second experimenter, blind to all treatment conditions, measured the six dependent variables. Measurements were taken once a week and at a six-week follow-up. The overt measurements, an approach behavior test and heart rate, were measured before the session and at the maximum approach point. There were four subjective measures.

Results of the approach behavior test indicated a greater improvement during the COR phase as compared to "psychotherapy." Without the imagined reinforcer, the approach behavior continued to increase, but the increase was not as great as in phase four when COR was reinstated. During the no treatment phase there was a decrease in the approach behavior whereas in participant modeling, there was an increase.

During phase three, three subjective measures included an attitude and global fear of rats, and an anxiety rating while near the cage of a live rat. The only measure that remained constant was the anxiety rating at the doorway of the room which housed the rat.

This clinical treatment lasted only two months and all measures showed a

decided improvement. Results were maintained at a six-week follow-up and a four and a half month telephone interview. This study is a good clinical test of a clinical procedure.

Manno & Marston (1972) used COR to decrease the maladaptive approach behavior of overeating. All subjects wanted to lose a minimum of 15 pounds. Seven subjective rating scales, and actual weight, served as pre-post measures. The authors compared a group administered COR and a group administered covert sensitization (labelled negative covert reinforcement) to a contact control group. Both treatment groups did significantly better than the control, but they did not differ significantly from each other.

At a three month telephone follow-up all three groups had a further weight loss as compared to their weight at the end of treatment. The two treatment groups, however, had a greater weight loss compared to the control group. This study and Blanchard & Draper's (1973) study are the only two studies with long term follow-ups.

DISCUSSION OF COR STUDIES

General Considerations

Cautela has taken great pains in outlining in detail the clinical application of COR. However, nowhere in the literature is there an overall consideration of the experimental procedure. The following drawbacks of inter-experimental variability are discussed in an effort to help systematize future research.

Drawbacks in design. In the experiments reviewed in this paper, the instructions "to imagine" are not presented in a standard manner. This would make it easier to compare studies and more closely approximate the clinical situation as described by Cautela.

In all of these studies, the reinforcing stimuli are not quantified. For example, one of the items on the RSS is receiving praise. We have no indication in these experiments as to how much praise the subject might be receiving, by whom and under what circumstances. Also, Cautela et al. (in press) used the term "neutral" scene implying that the subject rated "not at all" pleasant on the RSS. However, an aversive scene could be so categorized. Not all experiments control for the duration of the scene or clarity of the scene. Most of these, however, control for the frequency of the reinforcing stimulus.

Subject motivation. Sources of motivation variability among subjects include differential reinforcement by the experimenter, self-selection into a study, and differences in sample characteristics (e.g., student vs. clinical). Many of the studies may fall plague to a criticism that may be leveled at studies both in and out of the behavior therapy discipline; that is, the subtle reinforcing

and aversive feedback from the experimenter concerning the subject's own behavior which effects experiment outcome. In many of the experiments, the subjects were college students. Wisocki's (1973a) and Manno & Marston's (1972) subjects defined themselves as having maladaptive behaviors and volunteered to participate in the study to change that problem. Manno & Marston's (1972) subjects were willing to supply a \$15 refundable deposit. The subject in the study done by Blanchard & Draper (1973) had a "clinically disabling" phobia. In the other studies, the subjects had no defined clinical problems, and may have participated for a variety of reasons which might include: being paid, meeting course requirements, and some might have participated out of curiosity. Bernstein & Paul's (1971) discussion of small animal phobias seems applicable here:

A college student, participating in an experiment conducted by a professor or other authority figure, is likely to be sensitive to and strongly influenced by social cues regarding appropriate behavior as they are communicated to him throughout the study.

Unfortunately, one strong index of this, the verbal instructions, has been deleted from most of the write-ups.

The two studies on positive "self-concepts" (Krop et al., 1971; Krop, Perez, & Beaudoin, (1973), and the study by Steffen (1971) are pioneering studies in the area of covert conditioning. The subjects were institutionalized, and some were diagnosed as chronic "schizophrenics." Some behavior therapists, including Wolpe (1970), believe that imagery techniques are not applicable to "schizophrenics and psychotics" since they are deficient in cognitive processes. The experimenters appear to have selected the subjects because they were available and were potentially cooperative. These studies at least suggest that there should be further investigation.

Subjects' expectancies. In three experiments (Cautela et al., in press; Cautela et al., 1971; Ascher, 1973), the subjects were asked if they knew the purpose of the experiment at the end of the experimental sessions. Only two of the 92 subjects in these three experiments could identify the purpose. In Cautela et al. (in press) and Cautela et al. (1971), the authors state, therefore, that the subjects did not behave in a way they thought would please the experimenter. However, Salzinger's (1969) review of the literature on verbal conditioning indicates that although the subject may not be aware of the contingencies, he may be responding to slight social cues regarding desired behavior. Ascher, however, refers to Dulaney (1961) who states that the subjects might have been aware of the purpose of their performance, and that this was not determined in the post-experimental interview. This involves a methodological problem. If subjects are not questioned thoroughly enough, then experimenters will not get the data on awareness. If subjects are questioned too thoroughly, experimenters may shape the subjects into the answer.

Generalization to non-experimental situations. Subjects in the study by Cautela et al. (1971) were asked to practice 21 times in 3 weeks. They practiced on the average of four times. Despite this poor cooperation, there was a significant behavior change. This may have occurred with so few trials because the behavior was not long standing with strong and complex histories of reinforcement. Clinical behaviors are generally more difficult to change. Generally therapists not only have to help change the maladaptive clinical behavior, but also teach incompatible responses to produce long term results with generalization. It is then that the question of the client's willingness to practice say 20 scenes per day becomes critical.

Experimenter variability. All studies, but especially analogue studies of clinical behaviors, require the experimenters to be well versed not only in the procedure itself, but also the small but important technical problems that arise during the experiment. Otherwise, treatment may be biased. Most studies failed to describe the experimenter's characteristics, including his experience.

Measures. One of the assumptions in covert reinforcement is that the technique will result in a change in overt and covert behavior in a manner similar to a change in behavior from an overt reinforcing stimulus following an overt behavior. Studies should include measures of both covert and overt behavior. Only two studies do this (Flannery, 1972a; Blanchard & Draper, 1973). Many of the studies which measure covert behavior (thought, feeling, or image) need improved measures. Wisocki (1973a) is suggestive, but as the author notes, the single no contact group did not control for the non-specific effects of merely being treated or the subject and therapist characteristics. While Krop et al's (1971) experiment has fewer control difficulties, we cannot meaningfully compare the two groups. The two studies on "self-concept" (Krop et al., 1971; Krop, Perez & Beaudoin, 1973) need multiple measures. Flannery's (1972a) multiple measurements of covert behavior are generally in harmony with the overt behavior change. Blanchard & Draper's (1973) covert and overt measures were in harmony in all phases except the third.

Assumption testing. Aside from the issues of efficacy, Cautela has stressed the assumption that the technique can be subsumed under the operant conditioning paradigm and that covert events obey the same laws as overt events. These theoretical considerations need further exploration.

Problems would arise if the COR procedure was primarily an operant. Take, for example, test anxiety. If a subject imagines taking a test, but does not imagine being completely calm and relaxed, and there is some felt anxiety, then the feeling of being anxious might be reinforced. An alternative explanation is that reciprocal inhibition is a secondary property of reinforcement. In Flannery's study (1972a) COR may have served as a distraction as well as

reinforcing approach behavior. These explanations are not applicable to some experiments, such as circle size perception, in which non-avoidance behaviors are manipulated.

Only one study (Krop et al., 1971) has tested Cautela's second assumption that covert events effectively control other covert and overt behavior in the same way as externally applied stimuli. While the covert procedure was more effective than the overt procedure, this was not the strongest test of the assumption since the reinforcers in the two groups were not equated in quantity and quality.

Variability of number of reinforcement trials. Since the number of reinforcers per subjects in three studies (Steffen, 1971; Krop et al., 1971; Krop, Messinger, & Reiner, in press) was dependent upon the idiosyncratic frequency of the behavior, not all subjects received the same number of COR trials. For four of the studies (Cautela, et al., in press; Krop, Messinger, & Reiner, in press; Krop, Perez, & Beaudoin, 1973; Steffan, 1971) a non-contingent reinforcement group imagined the reinforcement on the predetermined schedule. They may have occasionally reinforced a target behavior. One might look at this as a comparison of the relative frequency of reinforcement between the noncontingent group and the COR group. Compared to the no feedback control groups, however, the non-contingent groups did not differ in any of the studies. This critique does not hold true for the non-contingent control groups used by Ascher (1973) and Marshall et al. (1974), since the imagined reinforcement never followed the target behavior.

Extinction of COR. Blanchard & Draper (1973) state the reinforcer in the COR procedure, "may not be necessary for improvement, [but] it is certainly facilitative." This conclusion was based on the results of their control phase for the imagined reinforcer, where approach behavior increased when the subject just imagined the behavior but the increase was not as great as in COR. This phase appears to be more like an extinction phase rather than a test of the necessity of a reinforcer since an initial baseline of the imagined behavior without the reinforcement was not taken.

During the extinction phase, Ascher (1973) found that imagining the behavior to be increased alone did not increase the probability of the target behavior. Secondly, Ascher used only three extinction trials, after 50 COR trials, and had trends (although not statistically significant) toward a return to baseline.

One possible difference in the results is that the rodent phobia was a clinical case, and the subject had more self reinforcement trials outside the clinical setting prior to the extinction phase, and it was thus more difficult to extinguish. This phenomenon requires more study.

Non-correspondence between clinical and experimental definitions of COR. In his original and later description of COR, Cautela (1970c; 1973) has stated that “*both* the response and reinforcing stimulus are presented in imagination.” (Emphasis added.) The experiment by Cautela et al. (in press), the two studies on positive “self-concepts” (Krop et al., 1971; Krop, Perez, & Beaudoin, 1973), eye contact (Krop, Messinger, & Reiner, in press), Flannery’s (1972a) first experimental group and Steffan’s (1971) study does not technically fit the original COR definition. The behavior to be increased is overt and the reinforcing stimulus is presented in imagination. This does not mean to imply that the studies are hereby discredited. They immediately suggest very strong clinical procedures. Since in the experiments both covert and overt responses were used, we suggest that the definition of covert conditioning be expanded to include covert and overt behavior that is followed by a stimulus presented in imagination. Thus, there are two possible combinations of COR:

Covert behavior: covert stimulus

Overt behavior: covert stimulus

SUGGESTIONS FOR FURTHER RESEARCH

Experimental evidence on COR indicates that it is a successful method of modifying a wide variety of behaviors. Our suggestions for further research focus on (1) standardization of measurements, (2) standardization of design, and (3) process studies i.e., the analysis of effective variables of COR. The following suggestions seem applicable to COR, other covert conditioning techniques, and other behavior modification techniques.

Standardization of Measurements

Further studies in covert conditioning, as mentioned above, should have better measurements. Studies of anxiety should have multiple measures, including physiological, subjective and behavioral, as in Blanchard & Draper’s study (1973). In terms of behavioral measures, the subject should be monitored in as close to the target behavior as possible. Paul’s (1966) study on systematic desensitization of a speaking phobia could be used as a guideline.

Cautela (1970a; 1973) has defined covert behavior as a thought, feeling or image. Thus there are a number of different behaviors subsumed under the rubric of covert behavior. Covert events are even more elusive because we have no way of observing them. It seems necessary, therefore, that we use multiple measures of subjective reports. It also seems that we should have a measure other than a subjective measure of covert behavior. Research has indicated that there are physiological measures of some covert events, including sexual arousal and imagined aversive events (Barlow et al., 1969; Barlow

et al., 1972). Schwartz & Higgins (1971) have shown that there are physiological measures of covert behavior, which are the same as a related overt behavior but of a less intensity. Van Egeren et al. (1971) have found that imagining threatening scenes produces autonomic arousal in direct proportion to the degree of subjective threat associated with the scenes.

Standardization of Design

Standardization of design would allow more meaningful comparisons of studies. Unless the variables listed below are treated as independent variables, we suggest the following standardizations.

Experimenter's characteristics. The experimenter should have previous clinical experience in using behavior modification techniques in general and the covert conditioning techniques specifically. Small, but nonetheless technical questions which arise during an experimental session must be handled smoothly by the experimenter. Otherwise, mishandling of the technical problems might bias subjects' subjective reports. Also, pseudo-treatment "placebo" groups seem to be particularly susceptible to mishandling, given the level of sophistication of many college students.

Instructions "to imagine." The instructions "to imagine" should be standardized. All should use Cautela's instructions presented above.

Imagery. Cautela (1970c; 1973) instructs the client to signal when the image of the behavior to be increased is clear. The client is immediately instructed to switch to the reinforcing scene. Prior to using a stimulus as a reinforcer, Cautela (1970c; 1973) asks the client to rate an imagined reinforcer both on clarity and pleasurable (i.e., quality of reinforcement) on a zero to five scale. Zero indicates not at all and five indicates very much. Those stimuli rated on four to five both on clarity and pleasurable are then employed. Secondly, the scene is only used if the reinforcer can be imagined within five seconds following a clear image of the response to be increased. Wisocki (1973a) used this criteria for her study. This follows from Cautela's assumption that overt and covert conditioning obey the same parameters of reinforcement (1970c; 1973). In overt reinforcement, the reinforcer is generally less effective if delayed (Kimble, 1971).

Reinforcement scene duration. Duration of the imagined reinforcer should be held constant. Subjects vary among themselves and from trial to trial with regard to the amount of time required to obtain a clear image. The duration should be measured from the time the subject signals that the image is clear. Subjects held the scene for five seconds in Ascher's study (1973) and for

fifteen seconds in Tondo & Cautela (1974). These are limits which are both adequate and not fatiguing.

Intertrial interval. The time between conditioning trials should be controlled. Ascher (1973) had a ten second interval between trials. This seems to be an adequate interval.

Controls. Treatment of controls should be as similar to the experimental procedure as possible. In Flannery (1972a) and Krop, Perez & Beaudoin (1973), control groups were given COR training. Ascher (1973) included COR training in one control group.

Controls should believe that they are in an experimental group and participating in a legitimate procedure. We suggest experimenters hand each subject at the end of each experiment a written note stating: Psychological research generally includes a "real" group and a "pseudo" test group. Check which group you believe you were in: "real" group _____; "pseudo" group _____. While the results of this may be controversial, such public information (contingencies) would help the experimenters strive to treat all groups equally and decrease the possibility of subtle differential shaping by experimenter feedback to different groups. These points concerning the standardization of design, of course, should be empirically investigated. By treating the above as independent variables, we could then determine optimal scene duration, intertrial interval, and the best instructions to imagine.

Process Studies

The studies reviewed above suggest that COR is an effective procedure. Research should now examine what variables, in fact, are responsible for the change.

For example, studies by Barlow et al. (1969) and Barlow et al. (1973) using a single case study design, have shown that the important variable in covert sensitization is the pairing of the behavior to be decreased followed by the aversive scene, and the instructions of expected treatment outcome are not important.

One of the distinct advantages of the covert conditioning procedures in general and COR in particular is its apparent systematization. Clinicians have a wide variety of techniques applicable to many behavioral disorders. The assumption that the overt operant literature may be applicable to covert behavior is heuristically valuable for the researcher.

Other possible further areas of research, we suggest, would be to determine if the parameters of covert conditioning are in fact the same as the parameters of overt conditioning. We know that there are a number of other parameters of overt reinforcement. These include:

1. **Intertrial Interval:** Conditioning is more effective when there is an interval between conditioning trials. This is to avoid inhibition of reinforcement as Pavlov labeled it (1927) or reactive inhibition, as Hull (1943) conceived it.

2. **Immediacy of Reinforcement:** Reinforcement is more effective when administered immediately after the response is emitted than when it is delayed (Kimble, 1961).

3. **Schedules of Reinforcement:** Some schedules of reinforcement produce higher rates of responding than others. For example, differential reinforcement of high rates of responding schedule (DRH) produces a high rate of responding whereas a differential reinforcement of low rates of responding schedule (DRL) produces low rates (Reynolds, 1968).

4. **Drive State:** Data indicate that when an organism is in a deprived state such as hunger, a reinforcer such as food will have a greater effect on increasing response probability than if the organism is not in a deprived state (Kimble, 1961).

Two studies (Ascher, 1973; Blanchard & Draper, 1973) have studied extinction. Goguen (1973) studied the effects of overlearning on the treatment of smoking behavior using COR and covert sensitization. One group received six additional sessions of treatment after they had stopped smoking. Results of a six week, three month, and six month follow-up indicated that those who had overlearning "showed a significantly lower percentage of recuperation of their pre-experimental smoking level as compared to a control group of smokers who received covert conditioning until they stopped smoking without overlearning."

Baron (1974), using an overt response and a covert reinforcer, investigated some of the parameters of COR. Subjects key pressing was reinforced on a concurrent variable interval schedule. She used reinforcing scenes rated either highly pleasurable or of little pleasure as well as scenes of long and short duration (25 and 5 seconds). Results indicated a significant difference for when reinforcer quality was varied, but not for scene duration.

Parameters specific to the imagery techniques need further investigation. For example, studies examining the subject's imagery clarity have had differing results. Wisocki (1973a) and Baron (1974) both found a significant relationship between a change in behavior and clarity of imagery. Manno & Marston (1972) did not. More recently Tondo & Cautela (1974) used a circle size perception task with high imagery and low imagery experimental and control groups. High imagery-experimental subjects showed a significantly greater behavior change than either low imagery-experimental or high imagery-control subjects. However, there was no main effect for the COR groups.

Although some of the studies reviewed above do not have adequate controls, all have shown to be effective in modifying a number of behaviors. These behaviors include attitudes toward the "mentally retarded" (Cautela et al. 1971), certain behavioral tasks (Steffan, 1971; Ascher, 1973; Tondo & Cautela, 1974; Cautela et al., in press), behaviors where anxiety is the dependent variable (Blanchard & Draper, 1973; Flannery 1972a; Wisocki, 1973a; Marshall et al., 1974) and maladaptive approach behaviors (Manno &

Marston, 1972). These experiments have also shown that COR is effective in a group setting (Manno & Marston, 1972; Wisocki, 1973a; Marshall et al., 1974) and using single case experimental design (Blanchard & Draper, 1973). Although the subject population of most of the above studies were college students, the study by Steffen (1971) and Krop, Perez, & Beaudoin (1973) showed that COR can be effectively used to modify the behavior of psychiatric patients, while the study by Krop et al. (1971) was effective with children who had diagnosed behavioral disorders.

Given the breadth of experimental and clinical cases, which have all been shown to be effective, we feel that fruitful areas of further research in COR include (1) treating the proposed guidelines as independent variables, (2) testing Cautela's assumptions, and (3) determining what variables are important in treatment outcome.

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